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Market Grades and Standards for Carnations, Chrysanthemums, and Roses

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Sponsored by the agricultural experiment stations of Alaska, Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin and the Economic Research Service, U.S. Department of Agriculture cooperating. The North Central Regional committee is given on page 24.

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Market Grades and Standards for Carnations, Chrysanthemums, and Roses

Grading is the sorting of products into lots, each of which has substantially homogeneous quality characteristics. Standardization means making the quality specifications of grades uniform among buyers and sellers, from place to place, and from time to time. For many years uniform standard grades have facilitated pricing and made crop reporting and market information more meaningful for fresh produce. Flowers, a fresh market product, have not been graded according to recognized uniform standards. The lack of a "common language" for communication and marketing has been considered a serious obstacle in the development of a more effective and efficient distribution system for floral crops (3, 6, 15).

Flowers have been sorted into "best," "next best," and "culls" almost since the beginning of wholesale flower marketing. Such sorting became a necessity when it was found that including flowers of inferior quality in the sales unit decreased the value of those of superior quality. Ideas of what constitutes "best" and "next best" quality have varied widely between growers and from area to area. Furthermore, the standards for sorting changed from season to season.

Systems for grading flowers by uniform standards have been proposed (12, 13), evaluated (1), and spasmodically attempted. None have been unanimously accepted and adopted as uniform for the entire United States.

The Society of American Florists and the U.S. Department of Agriculture jointly sponsored a conference in 1955 (7) at the conclusion of which a recommendation was made that research on standards and grading of floral products be an "area of study for immediate attention." The directors of the agricultural experiment stations of the North Central Region recognized the need of the floral industry for assistance in this area of study and in 1956 appointed a committee to develop a system of grades and standards for floral crops. This committee has been variously identified as NCT-27, NCM-22, NCR-40, and NCM-35.

The underlying philosophy of the committee as it began its work was that a system for grading floral crops by uniform standards was essential to the continued growth and prosperity of the floral industry, particularly in view of the increasing volume of flowers being shipped across the country, the reliance on the telephone as the chief means

of communication between buyer and seller, and the development of international trade in floral crops.

A grading system based on uniform standards results in lower marketing costs and more efficient production. Such a system:

1. Saves time in buying since graded products can be accurately and briefly described. Uniformity within the sales unit or bunch reduces loss from concealed inferior flowers and simplifies or eliminates the need for inspection.

2. Makes price quotations and market reports more meaningful because grade names identify varying qualities understood by both buyer and seller.

3. Facilitates long-distance selling and thus opens more markets to the products of a given producer and widens the procurement area for buyers.

4. Establishes the value of a product more accurately, facilitating settlement of claims for damage or disagreements between buyer and seller.

5. Permits the results of research to be expressed in uniform and accurate terms.

6. Provides information on graded products, enabling production management to make sounder plans for future production, to compare crop yields more accurately, and to regulate production practices more intelligently.

7. Encourages the development of automatic or semiautomatic techniques of grading.

A system of grades and standards must be justified on an economic basis. The differences in quality characteristics between grades must be apparent to the buyer before he will pay a higher price for some grades than for others. A useful standard must be based on important and recognizable characteristics which can be accurately and uniformly measured and interpreted. Standards should be practical and realistic, and should be phrased in familiar terms.

With these concepts in mind, the committee formulated the following objectives:

1. To identify factors determining quality in carnations, chrysanthemums, roses, and other floral crops and to develop methods for measuring these factors.

2. To develop specifications for market grades and standards for carnations, chrysanthemums, roses, and other floral crops.

3. To determine the market acceptability of these grades and standards.

Identification of Factors Determining Quality

carnations and chrysanthemums

Gaylord and Hoxsie (8, 9) surveyed flower growers, retailers, and wholesalers in 1957 to evaluate the selling and purchasing of cut carnations and chrysanthemums with respect to sorting, grading, and labeling methods, and to identify and evaluate those factors of quality and grade considered important by the floral industry.

Members of the floral industry referred to grading terms such as "Fancy" and "No. 1" in sorting and marketing carnations, but only limited uniformity existed among markets, growers, retailers, and wholesalers in defining the specifications for these loosely described grades. Industry members generally agreed that the following factors were most important in determining quality for carnations and chrysanthemums: flower — freshness, stage of maturity, size, form, and color; stem — length, stiffness, and straightness; foliage — cleanness and freshness; freedom from damage to flowers, stems, and foliage. The No. 1 grade was identified by most as similar to the Fancy grade, but with smaller flowers.

Approximately 50,000 carnations and chrysanthemums were measured in Colorado, Florida, Illinois, Indiana, Massachusetts, and New York markets. California-grown flowers were measured at midwest markets. Measurements were made over the entire year to identify seasonal variations.

Flower size of carnations and standard chrysanthemums was measured as the greatest diameter across the flower; maturity was determined by the relative tightness or openness of the center of the flower; and stem length included the flower. The diameter of the stem at midpoint was found to give a good indication of the rigidity of the stem. Amount of damage to flower, stem, and foliage was visually determined.

The number of open flowers at the top of the stem of spray chrysanthemums and the number of stems per bunch were counted. Other measurements were the same as for carnations and standard chrysanthemums.

The data for carnations and for standard and spray chrysanthemums are summarized in Appendix A, Table 1, page 17.

roses

A survey was conducted in 1960 of 325 retail florists by Coorts and Culbert (5) to identify factors considered important by retail florists in determining quality in cut roses and to obtain opinions on current rose-sorting practices. Quality factors identified in order of importance were as follows: flower — freshness, stage of maturity, size, form, and color; stem — length, stiffness, straightness, and freedom from "hooks"; amount of insect and disease damage; and foliage color. The retail florists considered flower characteristics more important than stem or foliage characteristics.

Sixty-five percent of the respondents were dissatisfied with the sorting and bunching of roses. Retail florists were critical of the inclusion of defective flowers or stems in the bunch, stems with "hooks," variable stem length within the bunch, damaged foliage, immaturity, and nonuniform maturity of the flowers.

Over 10,000 roses of the cultivars Better Times, Pink Sensation, and Yuletide produced by middlewestern growers were measured in 1961-1965 by Coleman (4), Stadin (14), and G. D. Coorts and J. R. Culbert of the Illinois Agricultural Experiment Station. The following measurements were made on the Better Times roses: flower length, diameter, and number of petals; stem length, stiffness, straightness, and diameter at top, middle, and base; and total weight of flower, stem, and foliage. Measurements made on the Pink Sensation roses were: flower length and weight; stem length and base diameter; stem and foliage weight; and total weight of flower, stem, and foliage. Flower length, diameter, and degree of maturity; stem length, diameter at base and top, stiffness, and straightness; and total weight of flower, stem, and foliage were measured for the Yuletide roses. Information as to insect and disease damage, "off-color" foliage, broken stems, abnormal bud form, and presence of "hooks" was also recorded for all cultivars. A summary of these data is shown in Appendix A, Tables 2 through 4, page 18.

Measurement of Factors Determining Quality

Both visual inspection and objective measurement of quality characteristics are important elements in a workable system of grades based on realistic standards.

Freshness, color of flower, foliage, and stem, stage of flower maturity, flower symmetry and form, stem straightness, and damage to

flower, stem, and foliage can all be determined rapidly and accurately through visual inspection by experienced workers,

Flower size, stem length, and weight can be determined by measurement with simple equipment. Number of flowers per stem of spray chrysanthemums can be determined readily by count, and, with experience, by handling the spray without counting. Stem rigidity can usually be determined visually or by handling. Stems can be readily classified as to rigidity by holding the stem upright by its base at the 6 o'clock position on a clocklike device and noting the position of the flower. Flowers with the most rigid stems would be between 11 and 1. Flowers with weaker stems would be between 10 and 11 or 1 and 2; those with still weaker stems would be between 9 and 10 or 2 and 3. It is probable that mechanical devices can be designed to automatically or semiautomatically measure weight, stem length, and flower size.

Development of Specifications for Market Grades and Standards

The quality factors identified through the surveys and the measurements of flowers in the markets were used to develop specifications for the standards on which tentative grades were based. The following factors were found to be most important for carnations, chrysanthemums, and roses:

1. Freshness.
2. Color of flower, foliage, and stem.
3. Stage of flower maturity.
4. Flower size.
5. Number of flowers per spray (spray chrysanthemums only).
6. Flower symmetry and form.
7. Stem length.
8. Stem rigidity and straightness.
9. Amount of damage to flower, foliage, or stem.

Specifications developed for these factors apply only to individual flowers or sprays of flowers, together with the stem and foliage. No recommendations have been made by the North Central Regional committee regarding the number of flowers or sprays of flowers to be bunched together for marketing purposes. Commercial sales have usually been in units of 25 carnations, 6 or 12 standard chrysanthemums, and 12, 13, or 25 roses. Spray chrysanthemums have been commonly

sold by the "bunch," and frequently on the basis of weight per bunch, but no uniformity has been found in stem number or weight per bunch.

The concept of quality held by the committee and used in the development of specifications for grades was that all graded flowers must meet defined, minimum standards for the following factors:

1. Freshness.
2. Color of flower, foliage, and stem.
3. Stage of flower maturity.
4. Flower symmetry and form.
5. Stem rigidity and straightness.
6. Amount of damage to flower, foliage, and stem.

Flowers meeting the minimum standards for these quality factors are then sorted into groups (grades) with measurable, minimum standards for flower size, number of flowers per spray (spray chrysanthemums only), and stem length. Flowers that do not meet the minimum standards should be marked as ungraded and marketed as such.

The use of color to identify grade quickly in marketing channels has considerable merit. Commercial custom has suggested blue for the best grade, followed by red, green, and yellow for the second, third and fourth best grades. Purple is suggested as a color identification for flowers that noticeably exceed specifications for the blue grade. White is suggested as a color identification for flowers sold as "ungraded." The appropriate color should be attached to or appear on each bunch or box of flowers.

NCR Market Grades and Standards for Cut Carnations, Chrysanthemums, and Roses

NCR (North Central Region) tentative grades and standards for cut carnations and for standard and spray chrysanthemums were first published in 1958 (8). Revised grades and standards for these crops were accepted by the NCR committee in June, 1962, slightly modified in December, 1962, and then proposed as NCR grades and standards. Additional modifications were adopted in 1964 and 1966. The tentative grades and standards for carnations and for standard and spray chrysanthemums were modified on the basis of market tests and of changes suggested by growers, retailers, and wholesalers participating in the testing programs. The proposed NCR grades appear in Appendix B, pages 19 through 23.

Tentative grades and standards for Better Times and similar rose cultivars were accepted in December, 1962, by the NCR committee.

They were presented at the 1963 Annual Meeting of Roses, Inc., the national association of commercial rose growers. The proposed grades, incorporating modifications adopted in 1966, appear in Appendix B.

Testing Market Acceptability of Grades

Market testing of the tentative grades was the major research problem encountered. Nevertheless enough producers and wholesalers cooperated in testing programs to give validity to the tentative grades. Market tests were conducted in Indiana, Kansas, Michigan, Missouri, Nebraska, New York, and Wisconsin. Flowers graded according to the tentative standards were compared with those sorted by other methods on the basis of prices received by growers, amount of dumpage, and acceptance by retail florists, wholesalers, and producers. The following reports are typical of the results secured.

carnations

R. S. Lindstrom, of the Michigan Agricultural Experiment Station, compared the sales of carnations graded by NCR standards with local grower grades. A Michigan grower and a Michigan wholesaler cooperated in this project. The grower graded part of his production by NCR grades and part by his own system. The grower grade consisted of all flowers except "splits" and those with weak stems. Each sales unit was labeled to indicate grade.

The results in Table 1 suggest that grading by NCR standards was profitable to the Michigan grower. Although both the grower and the wholesaler were critical of the NCR system at the start, both felt the system was workable by the end of the project.

Goodrich (10) compared the prices of carnations graded by NCR standards with the average local "mostly" price reported for the New

Table 1. — Comparison of NCR Grade Prices for Carnations With Grower Grade Price at a Michigan Wholesale House, January 23 to June 3, 1960 (Unpublished data of R. S. Lindstrom, Michigan Agricultural Experiment Station)

Grade	Average price per flower	Flowers sold	Percent of flowers dumped
NCR Blue	12.0 cents	1,400	0
NCR Red	10.9 cents	12,075	2
NCR Green	7.8 cents	13,150	5
Grower grade	7.7 cents	43,125	7

Table 2. — Comparison of NCR Grade Prices for Carnation and Standard Chrysanthemums With New York City "Mostly" Prices, Six Growers, Southeastern New York, 1963-64

Grade	Average price as proportion of N. Y. City "Mostly" price		Average prices as difference from N. Y. City "Mostly" price	
	Carnations	Standard chrysanthemums	Carnations	Standard chrysanthemums
	(percent)		(cents per bloom)	
NCR Blue.....	126	127	+1.6	+7.1
NCR Red.....	110	114	+ .6	+3.8
NCR Green.....	102	97	+ .1	− .9

York City Cut Flower Market. Three New York growers and nine New York wholesalers cooperated in this project. Each sales unit was labeled by color tag to indicate grade. Results are shown in Table 2.

Blue and Red grade flowers returned prices 1.6 cents and 0.6 cent per bloom higher than the base price of the local "mostly" New York City report. Green grade carnations returned prices that were about the same as the local "mostly" quotation. Since the cooperating growers graded all their production by NCR grades, no information was available on prices that might have been realized had some of their flowers been ungraded.

Goodrich reported that, although labor costs resulting from the adoption of the NCR grading procedures increased about 60 percent in the first month, several months after the new grading system had been instituted labor costs had returned to near the level that prevailed before adoption.

standard chrysanthemums

Berninger (2) compared prices received for four grades of standard chrysanthemums produced by four Milwaukee area growers and marketed through three Milwaukee wholesalers. To secure producer cooperation the NCR specification for flower diameter for Blue grade was changed from the 6-inch minimum to a 5½-inch minimum, and Red grade was changed from the 5-inch minimum to a 4¾-inch minimum; specifications for the Green and Yellow grades were the same as the NCR minimums of 4 inches and less than 4 inches respectively. The grade of each unit of a dozen flowers was indicated by a tag of the proper color affixed to the unit. Each grower was identified by his firm name on the bunch wrapper. Since the participating producers were already grading their flowers to specifications similar to those

Table 3. — Average Prices per Dozen Received for Standard Chrysanthemums and Percent of Crop in Each NCR Grade by Four Milwaukee-Area Growers, February to June, 1962

Grade	Grower 1 (567 doz.)	Grower 2 (577 doz.)	Grower 3 (320 doz.)	Grower 4 (842 doz.)
NCR Blue.....	$4.55 (3.3%)	$4.57 (2.8%)	$5.43 (24.7%)	$4.88 (12.3%)
NCR Red.....	3.99 (28.3%)	4.08 (28.4%)	4.35 (52.4%)	3.80 (57.5%)
NCR Green....	3.29 (46.9%)	3.19 (48.5%)	3.53 (18.2%)	2.91 (24.7%)
NCR Yellow...	2.48 (21.5%)	2.29 (20.3%)	2.77 (4.7%)	2.13 (5.5%)

used in the study, a comparison of prices received for the color-coded and the unmarked flowers was not made. Results are shown in Table 3.

Prices received by all growers decreased with each decrease in flower size from the largest (Blue grade) to the smallest (Yellow grade). Differences in price to various growers in the same grade could be explained by the established reputation of the grower as judged by past experience of the buyer and the flower size as measured by the depth of the flower — a factor not described in the grade specification. The grower receiving the highest price for Blue and Red grades had the highest percent of his flowers in these two grades. This tended to enhance his reputation for quality production.

Goodrich (10) compared the prices of standard chrysanthemums graded by NCR standards with the average local "mostly" price reported for the New York City Cut Flower Market. Three New York growers and nine New York wholesalers cooperated in this project. Each sales unit was labeled by color tags to indicate grade.

Blue and Red grade flowers returned prices of 7.1 and 3.8 cents per bloom higher than the base price of the local "mostly" New York City report (Table 2). Green grade standard chrysanthemums returned prices that were about the same as the local "mostly" quotation. Since the cooperating growers graded all their production by NCR grades, no information was available on prices that might have been realized had some of their flowers been ungraded.

Industry Reactions to NCR Grades and Standards

carnations

Proposed NCR grades and standards for carnations were forwarded to the grades and standards committee of the Society of American Florists in June, 1962. These proposed grades and standards were modified by the SAF committee in March, 1963, and ap-

proved for market testing. At the request of the Society of American Florists, the American Carnation Society secured the cooperation of a number of its members in a nationwide testing program. The proposed grades were reviewed and again modified by the SAF committee on the basis of recommendations of those participating in the testing program. In March, 1964, these modified grades were adopted by the SAF and released to the industry through the trade press. A summary of NCR grades and standards for carnations and those adopted by the SAF is shown in Table 4.

Table 4. — Summary of NCR and SAF Carnation Grade Standards

Grade	Minimum flower diameter		Minimum stem length		Max. stem length, SAF
	NCR	SAF	NCR	SAF	
NCR Blue	3 in.	2¾in.	28 in.	22 in.	....
NCR Red	2¾ in.	2¼ in.	22 in.	17 in.	22 in.
NCR Green	2¼ in.	....	16 in.	10 in.	17 in.

Growers have reported their experiences with NCR grades or modifications of them. Hellberg (11), for example, stated that grading according to NCR standards was one of the most important factors in improving the efficiency of the marketing of his carnations.

In 1965 the Society of American Florists developed a nationwide education project for standard grades for cut flowers. A full-time project consultant was employed for six months in 1965-66. This consultant, a member of the NCM-35 committee, made a concentrated effort to secure industry acceptance of the SAF standard grades for carnations and the SAF trial standard grades for standard chrysanthemums. Results of this project have been substantial, and it will be continued in the future.

standard chrysanthemums

In March, 1964, the SAF grades and standards committee initiated preliminary studies of the proposed NCR grades and standards for standard chrysanthemums. The SAF committee slightly modified the NCR grades and standards, and released them on a trial basis in August, 1964, through the trade press to the floral industry. The trial grades and standards were slightly modified, adopted by the Society, and in December, 1965, released to the industry through the trade

Table 5. — Summary of NCR and SAF Standard Chrysanthemum Grade Standards

Grade	Minimum flower diameter		Minimum stem length	
	NCR	SAF	NCR	SAF
NCR Blue	6 in.	5½ in.	30 in.	30 in.
NCR Red	5 in.	4¾ in.	30 in.	30 in.
NCR Green	4 in.	4 in.	24 in.	24 in.
NCR Yellow	...	3¼ in.	24 in.	18 in.

press. A summary of NCR grade standards for standard chrysanthemums and those adopted by the Society is shown in Table 5.

spray chrysanthemums

In July, 1964, proposed NCR grades and standards for spray chrysanthemums were presented to an SAF grades and standards seminar for study and discussion. A thorough study of these proposed grades is being continued by the SAF grades and standards committee.

roses

Tentative NCR grades and standards for Better Times and similar hybrid tea rose cultivars were presented to Roses, Inc., in October, 1963. These tentative grades and standards are under study by the grades and standards committee of that organization. Many of the proposed standards were incorporated in the Code of Ethics adopted by the organization in 1966.

Summary

In 1956 a North Central Regional marketing committee accepted responsibility for developing grades and standards for the major cut-flower and flowering pot-plant crops.

The following factors were identified as most important in determining quality in cut carnations, standard and spray chrysanthemums, and hybrid tea roses: (a) freshness; (b) color of flower, foliage, and stem; (c) stage of flower maturity; (d) flower size of carnations, standard chrysanthemums, and roses; (e) number of flowers per spray of spray chrysanthemums; (f) flower symmetry and form; (g) stem length; (h) stem rigidity and straightness; (i) amount of damage to flower, stem, or foliage.

Many quality factors could be rapidly and accurately determined by visual inspection. Simple equipment was sufficiently accurate to

objectively measure flower size, stem length, and if necessary, stem rigidity.

Specifications for standards and grades were developed to apply only to individual flowers or sprays of flowers and accompanying stems and foliage.

Under the concept of quality held by the committee, all graded flowers must meet defined, minimum standards for these quality factors: freshness; color of flower, foliage, and stem; stage of flower maturity; flower symmetry and form; stem rigidity and straightness; amount of damage to flower, foliage, and stem. Flowers that meet minimum standards for these factors are then sorted into groups with measurable, minimum standards for flower size, number of flowers per spray (spray chrysanthemums only), and stem length. Flowers that do not meet these quality standards should be marked as ungraded.

Grades and standards for carnations and for standard and spray chrysanthemums were developed, market-tested, and accepted as NCR (North Central Region) grades and standards in December, 1962. Tentative grades and standards for Better Times and similar roses also were accepted at that time.

Proposed NCR grades and standards for carnations were transmitted to the Society of American Florists in June, 1962. The proposed grades were modified somewhat by the grades and standards committee of that organization, market-tested by members of the American Carnation Society, adopted by the SAF grades and standards committee in March, 1964, and released to the floral industry at that time. Additional modifications were made and adopted by the SAF committee in 1966.

Proposed NCR grades and standards for standard chrysanthemums were reviewed by the SAF grades and standards committee, were modified slightly by the SAF committee, and were released to the floral industry on a trial basis in August, 1964; further modifications were made in 1966, adopted by the Society, and released to the industry. Proposed NCR grades and standards for spray chrysanthemums were presented at an SAF seminar on grades and standards in July, 1964, for study and discussion and are still under study.

Tentative grades and standards for Better Times and similar roses were forwarded to Roses, Inc., in October, 1963, and are under study and review by the grades and standards committee of that organization. Some of the proposed standards were incorporated in the Code of Ethics adopted by Roses, Inc., in 1966.

Evaluation and Recommendations

1. Continuing experiences by the NCM committee and members of the floral industry with the NCR grades and standards for carnations and standard chrysanthemums as modified and adopted by the Society of American Florists have indicated that the floral industry ultimately can and will use these or similar grades and standards to further the growth and prosperity of the industry.

2. Market testing of NCR tentative grades and standards for spray chrysanthemums and hybrid tea roses is continuing at several agricultural experiment stations in the North Central Region and with cooperating growers, retail florists, and wholesalers. Following sufficient market testing to validate the usefulness of these, or modified, grade standards, the NCM committee recommends that the SAF grades and standards committee study, modify if necessary, and release grades and standards for these crops to the floral industry.

3. Further work is required before tentative grades and standards for cut gladiolus, snapdragons, and floribunda roses, and for potted chrysanthemums, Easter lilies, geraniums, and poinsettias can be developed and market-tested. The committee recommends that such work continue to its completion with the eventual goal being the submission of NCR grades and standards for these crops to the Society of American Florists.

4. The committee recognizes that for these voluntary grades and standards to receive uniform interpretation and to have legal stature they eventually must be administered by an appropriate governmental agency.

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Appendix A. — Compilation of Data

Appendix Table 1. — Measurement of Quality Factors of Carnations and Chrysanthemums as found in U. S. Flower Markets, 1957-58 (Gaylord and Hoxsie (8))

Quality factor	Measurements and percentages				
Carnation					
Flower diameter (in.)...	3–up 37.7%	2¾–3 44.3%	2½–2¾ 17.6%	2¼–2½ 0.4%	
Flower maturity.....	tight 12.4%	fairly tight 73.6%	open 14.0%		
Stem length (in.).....	30–up 12.8%	24–30 48.9%	20–24 30.6	15–20 7.7%	
Stem diameter (in.) (midpoint).....	6/32 up 29.5%	5/32 55.3%	4/32 15.0%	3/32 0.2%	
Standard chrysanthemum					
Flower diameter (in.)...	6–up 10.1%	5–6 33.9%	4–5 50.2%	3–4 5.8%	
Amount center of flower unopened (in.).....	1½–up 18.9%	1–1½ 72.1%	less 1 9.0%		
Stem length (in.).....	36–up 16.0%	30–36 48.2%	24–30 31.8%	18–24 4.0%	
Stem diameter (in.) (midpoint).....	9/32 up 36.0%	7/32–9/32 50.1%	5/32–7/32 13.9%		
Amount stem defoliated (in.).....	10–up 74.2%	6–10 25.8%			
Spray chrysanthemums					
Number open flowers per stem.....	12–up 3.0%	9–12 3.0%	6–9 22.8%	4–6 57.2%	3–less 14.0%
Flower maturity.....	tight 7.6%	fairly tight 85.0%	open 7.4%		
Stem length (in.).....	36–up 15.9%	30–36 28.1%	24–30 52.0%	18–24 4.0%	
Stem diameter (in.) (midpoint).....	7/32–up 56.3%	5/32–7/32 41.2%	3/32–5/32 2.5%		
Amount stem defoliated (in.).....	10–up 55.6%	6–10 44.1%	less than 6 0.3%		
Number stems per bunch	9–up 17.0%	7–9 28.7%	5–7 50.3%	4–less 4.0%	

Appendix Table 2. — Measurement of Quality Factors of Better Times Roses, 13 months, 1961-62 (Unpublished data of G. D. Coorts and J. R. Culbert, Illinois Agricultural Experiment Station)

Bunch length (in.)	Stem		Flower			Total weight	
	Mean length (in.)	Diameter at base (32nds of in.)	Diameter (in.)	Length (in.)	Petal number	Gr.	Gr. per in. of stem
9–12	10.9	4.3	.82	1.57	42	10.77	.99
12–15	13.4	4.7	.82	1.60	45	13.04	.97
15–18	16.0	5.0	.85	1.63	43	16.16	1.01
18–21	19.3	5.5	.86	1.65	44	19.56	1.01
21–24	22.0	5.8	.88	1.67	46	22.40	1.02
24–27	24.8	6.3	.90	1.70	46	26.08	1.05
27–30	27.8	7.0	.92	1.73	47	30.62	1.10
30–up	30.4	7.5	.93	1.71	47	33.17	1.09

Appendix Table 3. — Measurement of Quality Factors of Pink Sensation Roses, 12 months, 1964-65 (Stadin (14))

Bunch length (in.)	Stem			Flower		Total weight	
	Mean length (in.)	Diameter at base (32nds of in.)	Stem and foliage wt. (gr.)	Weight (gr.)	Length (in.)	Gr.	Gr. per in. of stem
9–12	10.9	5.1	4.7	6.7	1.38	11.5	1.09
12–15	13.7	5.5	6.9	7.3	1.46	14.1	1.04
15–18	16.8	6.2	9.6	7.7	1.46	17.3	1.05
18–21	19.8	6.6	12.2	8.0	1.46	20.1	1.03
21–24	22.7	7.1	14.8	8.4	1.54	23.2	1.03
24–27	25.7	7.5	17.9	8.5	1.54	26.3	1.03
27–30	28.6	7.8	20.5	8.4	1.54	29.0	1.02
30–up	31.7	8.2	24.4	8.6	1.58	35.7	1.13

Appendix Table 4. — Measurement of Quality Factors of Yuletide Roses, 8 months, 1964-65 (Coleman (4))

Bunch length (in.)	Stem		Flower		Total weight	
	Mean length (in.)	Diameter at base (32nds of in.)	Diameter (in.)	Length (in.)	Gr.	Gr. per in. of stem
9–12	12.3	5.0	1.2	1.5	14.2	1.15
15–18	18.1	6.2	1.2	1.6	20.4	1.13
21–24	23.9	6.9	1.1	1.6	25.0	1.05
27–30	30.0	7.6	1.2	1.6	31.5	1.05

Appendix B. — NCR Grades and Standards

NCR market grades and standards for cut carnations (not including miniature types)

Blue Grade shall consist of a flower that is fresh (a), fairly tight (b), symmetrical (c), free from calyx splits (d), and not less than *3 inches* in diameter (e). The stem shall be not less than *28 inches* in length (f), fairly straight (g), rigid enough to hold the flower in a fairly upright position, and free from buds and suckers. Flower, stem, and foliage shall be free from damage (h).

Red Grade shall consist of a flower that is not less than *2¾ inches* in diameter on a stem not less than *22 inches* in length and meets all the other specifications for *Blue Grade.*

Green Grade shall consist of a flower that is not less than *2¼ inches* in diameter on a stem not less than *16 inches* in length and meets all the other specifications for *Blue Grade.*

Yellow Grade shall consist of a flower that is fresh, fairly tight, free from calyx splits or damage on a stem that is not less than *10 inches* in length.

Tolerance (for all grades): Not more than 5 percent, by count, of any lot shall fail to meet the specifications of the grade.

When bunched, all flowers per bunch shall be the same cultivar, of uniform, bright color, and of the same or similar stage of maturity.

definitions

a. Fresh means that the flower is bright in color, turgid, and in prime condition.

b. Fairly tight means that the petals near the center of the flower are tight or unopened, and the outside petals are fully expanded horizontally.

c. Symmetrical means that the flower is of normal shape and is placed with the plane of the outer petals approximately at a right angle to the main stem axis.

d. Split calyx means the separation or splitting of the calyx lobes, permitting petals to be released from the calyx.

e. Diameter means the greatest distance, as measured through the center of the flower.

f. Length means the distance between the bottom end of the stem and the top of the flower.

g. Fairly straight means that the stem is of normal growth and not more than slightly curved or crooked.

h. Damage means any discoloration or defect caused by dirt or other foreign material, by moisture, disease, or insect, or by nutritional, chemical, or mechanical means which affects the appearance or shipping quality.

summary of NCR market grades for cut carnations:

Grade	*Minimum flower diameter*	*Minimum stem length*
Blue	3 inches	28 inches
Red	2¾ inches	22 inches
Green	2¼ inches	16 inches
Yellow	...	10 inches

NCR market grades and standards for cut standard chrysanthemums

Blue Grade shall consist of a standard (a) chrysanthemum flower that is fresh (b), symmetrical (c), fairly tight (d), and not less than *6 inches* in diameter (e). The stem shall be not less than *30 inches* in length (f), fairly straight (g), free from buds and suckers, and rigid enough to hold the flower in a fairly upright position. The foliage shall have been stripped from at least one-third but not more than one-half the total length of the stem measured from the bottom. Flower, stem, and foliage shall be free from damage (h).

Red Grade shall consist of a flower that is not less than *5 inches* in diameter on a stem not less than *30 inches* in length and meets all the other specifications for Blue Grade.

Green Grade shall consist of a flower that is not less than *4 inches* in diameter on a stem not less than 24 inches in length and meets all the other specifications for Blue Grade.

Yellow Grade shall consist of a flower that is fresh, fairly tight, and symmetrical on a stem that is not less than *24 inches* in length and rigid enough to support the flower in a fairly upright position. The flower, stem, and foliage shall be free from damage.

Tolerance (for all grades): Not more than 5 percent by count, of any lot shall fail to meet the specifications of the grade.

When bunched, all flowers per bunch shall be of the same cultivar, of uniform, bright color, and of the same or similar stage of maturity.

definitions

a. Standard means chrysanthemums with one flower per stem.

b. Fresh means that the flower is bright in color, turgid, and in prime condition.

c. Symmetrical means that the flower is of normal shape and is placed with the plane of its diameter approximately at a right angle to the main stem axis.

d. Fairly tight means that the center petals (florets) are unopened and do not expose the center of the flower.

e. Diameter means the greatest distance measured across the flower,

f. Length means the distance between the bottom end of the stem and the top of the flower.

g. Fairly straight means that the stem is of normal growth and is not more than slightly curved or crooked.

h. Damage means any discoloration or defect caused by dirt or other foreign material, by moisture, disease, or insect, or by nutritional, chemical, or mechanical means which affects the appearance or shipping quality.

summary of NCR market grades for cut standard chrysanthemums:

Grade	*Minimum flower diameter*	*Minimum stem length*
Blue	6 inches	30 inches
Red	5 inches	30 inches
Green	4 inches	24 inches
Yellow	..	24 inches

NCR market grades and standards for cut spray chrysanthemums

Blue Grade shall consist of a spray (a) of chrysanthemums with flowers that are fresh (b) and symmetrical (c). There shall be not less than *nine* fairly tight (d) top flowers per spray. The stem shall be not less than *30 inches* in length (e), fairly straight (f), and rigid enough to hold the flowers in a fairly upright position. The foliage shall have been stripped from at least one-third but not more than one-half the total length of the stem measured from the bottom. Flowers, stem and foliage shall be free from damage (g).

Red Grade shall consist of a spray that has not less than *seven* fairly tight top flowers on a stem not less than *30 inches* in length and meets all the other specifications for Blue Grade.

Green Grade shall consist of a spray that has not less than *five* fairly tight top flowers on a stem not less than *24 inches* in length and meets all the other specifications for Blue Grade.

Yellow Grade shall consist of a spray that has not less than *three* fresh, fairly tight, symmetrical top flowers on a stem not less

than *24 inches* in length and rigid enough to support the flowers in a fairly upright position. Flowers, stem, and foliage shall be free from damage.

Tolerance (for all grades): Not more than 5 percent, by count, of any lot shall fail to meet the specifications for the grade.

When bunched, all flowers per bunch shall be of the same cultivar, of uniform, bright color, and of the same or similar stage of maturity.

definitions

a. Spray means chrysanthemums grown with more than one flower per stem.

b. Fresh means that the flowers are bright in color, turgid, and in prime condition.

c. Symmetrical means that the flowers are of normal shape.

d. Fairly tight means that the centers of the flowers are not fully opened or developed.

e. Length means the distance between the bottom end of the stem and the topmost flower of the spray.

f. Fairly straight means that the stem is of normal growth and is not more than slightly curved or crooked.

g. Damage means any discoloration or defect caused by dirt or other foreign material, by moisture, disease, or insect, or by nutritional, chemical, or mechanical means which affects the appearance or shipping quality.

summary of NCR market grades for cut spray chrysanthemums:

Grade	*Minimum number of fairly tight top flowers per stem*	*Minimum stem length*
Blue	9	30 inches
Red	7	30 inches
Green	5	24 inches
Yellow	3	24 inches

NCR tentative market grades and standards for cut hybrid tea roses[1]

Blue Grade shall consist of a flower that is fresh (a), fairly tight (b), and of typical form and size (c) for the cultivar. The stem shall be fairly straight (d), free from buds, suckers, and "hooks" (e), and rigid enough to hold the flower in a fairly upright position. When

[1] Apply only to hybrid tea rose cultivars "Better Times," "Pink Sensation," and "Yuletide" grown with one flower per stem, sports of these cultivars, and other cultivars similar in flower and growth characteristics.

bunched or boxed, the length (f) of each stem shall be approximately the same and shall be not less than the minimum length indicated on the bunch or box. The number of grams of weight (g) of each stem per bunch or box shall be equal to or greater than the minimum number of inches of stem length indicated on the bunch or box. Flower, stem, and foliage shall be free from damage (h).

Red Grade shall consist of a flower with its stem and foliage that meets all the specifications for Blue Grade except that for weight.

All other marketable flowers not qualifying for Blue or Red Grade shall be designated as "seconds" and identified by a white wrapper. Flowers shall be fresh, fairly tight, and on fairly straight stems. When bunched or boxed, the length of each stem shall be not less than the minimum length indicated on box or bunch. The flower, stem, and foliage shall be free from serious damage.

Tolerance (for all grades): Not more than 5 percent, by count, of any lot shall fail to meet the specifications for the grade.

When bunched or boxed, all flowers per bunch or box shall be of the same cultivar, of uniform, bright color, and of the same or similar stage of maturity.

definitions

a. Fresh means that the flower is bright in color, turgid, and in prime condition.

b. Fairly tight means that several outer petals are no more than slightly separated from the remainder of the bud, which remains tight and pointed.

c. Typical form and size means that the flower is of normal petalage and is similar to the accepted form and size for the cultivar and is not "bullheaded," "bullnosed," or otherwise misshapen.

d. Fairly straight means that the stem is of normal growth, and not more than slightly curved or crooked.

e. Hook means the section of "old wood" attached to the base of the stem and positioned to make a noticable angle with the stem.

f. Length means the distance between the bottom end of the stem and the top of the flower.

g. Weight means the total weight of flower, stem, and foliage.

h. Damage means any discoloration or defect caused by dirt or other foreign material, by moisture, disease, or insect, or by nutritional, chemical, or mechanical means which affects the appearance or shipping quality.

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